REMARKS

Claims 1-12, 14-22, and 24 remain in the case. Claims 25 and 26 have been added. Claims 10 and 24 has been amended. Claims 13 and 23 have been canceled.

The rejection of claim 1 under 35 U.S.C. 103(a) as being unpatentable over Bargman et. al. (6,421,592) in view of Kimbrough (6,370,467) is respectfully traversed.

Claim 1 recites a method for estimating the propensity of a vehicle to rollover. The lateral kinetic energy of the vehicle is determined in response to the longitudinal velocity and the vehicle side slip angle. A potentiality rollover index is then determined in response to the lateral kinetic energy and the lateral acceleration.

Bargman recites a reactive safety arrangement system for protecting an occupant of a vehicle in the event of a roll-over accident. The safety arrangement is adapted to trigger a signal to a safety device upon the detection of a roll. An arrangement of sensors monitors the angular velocity and the velocity of the vehicle. A signal for triggering a safety device (i.e., side curtains) for protecting an occupant of a vehicle is based on whether a measured roll rate reaches a threshold. The threshold is a function of the total speed of the vehicle or velocity in a predetermined direction and/or the actual roll angle or angular speed. The lateral acceleration, as recited in Bargman, is used as the threshold of control, that is, whether to arm the system if the lateral acceleration exceeds a predetermined threshold.

In contrast to Bargman, the present invention is proactive by preventing the rollover from occurring. In the present invention, a roll rate or roll angle is neither measured nor estimated. Rather, the present invention uses the vehicle lateral velocity and the measured lateral acceleration to calculate the vehicle lateral kinetic energy and the roll over potential energy margin. The vehicle roll over potentiality index is calculated as continuous functions of the kinetic energy and the potential energy and not just a threshold. Bargman fails to show a rollover potentially index that is determined in response to the lateral kinetic energy and the lateral acceleration.

The addition of Kimbrough fails to strengthen the rejection. The office action states that Kimbrough teaches an algorithm for determining vehicle lateral velocity from vehicle longitudinal velocity and vehicle side slip angle (col. 4 lines 10-20 and

col. 20 lines 37-38). Col. 4 lines 10-20 only describe an algorithm for estimating slip angles. Col. 20 lines 37-38 recites that the lateral velocity is derived algebraically from estimates of slip angle. There is no teaching in Kimbrough to determine the vehicle lateral velocity in response to the longitudinal velocity and the vehicle side slip angle, nor does Kimbrough suggest or teach how the lateral kinetic energy is determined in response to the longitudinal velocity and side slip angle. Bargman and Kimbrough either individually or in combination neither teach nor suggest a proactive vehicle rollover prevention system that determines the rollover potentiality index in response to the lateral kinetic energy and the lateral acceleration where the lateral kinetic energy is determined in response to the longitudinal velocity and vehicle side slip angle. Since Bargman and Kimbrough fail to teach or suggest the features of claim 1 either individually or in combination, the rejection of claim 1 should be withdrawn.

The rejection of claim 2 under 35 U.S.C. 103(a) as being unpatentable over Bargman et. al. (6,421,592) in view of Kimbrough (6,370,467) and Barta et. al. (20030055549) is respectfully traversed.

Claim 2 recites a method for detecting a rollover event. A potentiality rollover index is determined in response to the lateral kinetic energy and the lateral acceleration. A rollover index is determined by weighting the rollover potentiality index by a factor of the lateral acceleration. A determination is made whether the rollover index is above a predetermined threshold.

For the same reasons as set forth above for claim 1, the determination of the potentiality index in response to the lateral kinetic energy and lateral acceleration is neither shown nor suggested in either Bargman or Kimbrough. The addition of Barta fails to strengthen the rejection. Barta describes a system for determining the likelihood of a rollover of a vehicle. Barta uses a roll angle index that is determined from a combination of factors including preliminary estimates of the roll angle and is interpreted as a composite measure of the roll angle. The roll angle index is used as one of the factors in determining when the vehicle may be transitioning from normal operation to a two wheel lift off condition; however, the roll angle index is not the final determining factor for determining the likelihood of a vehicle roll-over in Barta. Rather, parameter and gain values are determined from a lookup table as a function of

roll angle index. The parameter and gain values are entered into a closed loop observer equation for determining a final estimate of a roll angle and roll rate which are then used an inputs to a lookup table for determining the likelihood or probability values of a rollover (section 102-108, 0121, Fig. 5). Claim 2 does not use measured or estimated roll angles or roll rates for determining a rollover index.

The rollover potentiality index as recited in claim 2 is not shown in Barta nor is the rollover index which is determined by weighting the rollover potentiality index by a factor of the lateral acceleration shown or suggested in Barta. A roll angle index, in Barta, is derived from roll angle estimates which the present invention of claim 2 ignores when determining the rollover index and rollover potentiality index. Furthermore, the weighting constant as used in Barta weights only a portion of the roll angle index equation (15) (i.e., a fraction between preliminary roll angle and the maximum roll angle). The combined teachings of Bargman, Kimbrough, and Barta do not show or suggest determining a rollover potentiality index based on the lateral kinetic energy and the lateral acceleration. Since Bargman, Kimbrough, and Barta fail to teach or suggest the features of claim 2 either individually or in combination, the rejection of claim 2 should be withdrawn.

Claim 4 recites that the vehicle side slip angle is determined by factors such as yaw rate, lateral acceleration, and a vehicle dynamic model. Kimbrough describes a slip angle that is derived by factors including longitudinal velocity and a lateral component (i.e., rl + v) which claim 4 does not utilize in determining the vehicle slide slip angle. Kimbrough does utilize the yaw rate, lateral acceleration, and a vehicle dynamic model to determine the a side slip angle. Combining Kimbrough with Bargman et. al. and Barta et. al. neither teaches nor suggests determining a vehicle side slip angel using the factors as recited in claim 4. Since Bargman et. al., Kimbrough, and Barta et. al., fail to teach or suggest the features of claim 4 either individually or in combination, the rejection of claim 4 should be withdrawn.

Claim 10 recites a control action for generating a torque reduction by a change in the engine output for counteracting an actual rollover form occurring. Barta describes a routine for reducing the likelihood of a rollover by applying a corrective brake torque. Barta fails to suggest a control action for conteracting an actual rollover by applying an engine torque reduction for changing the engine output. Since Barta,

Kimbrough, and Barta fail to teach or suggest the features of claim 10 either individually or in combination, the rejection of claim 10 should be withdrawn.

Claims 3, 5-9, 11, and 12 depend from claim 2 and are therefore allowable.

The rejection of claim 15-22 under 35 U.S.C. 103(a) as being unpatentable over Barta et. al. (20030055549) in view of Kimbrough (6,370,467) and Bargman et. al. (6,421,592) is respectfully traversed.

Claim 15 recites a system for estimating a propensity of a vehicle to rollover. The system uses a plurality of sensors to sense vehicle operating conditions, a vehicle specific dynamic model, and a controller for determining a side slip angle and for determining a rollover potentiality index in response to weighting the rollover potentiality index by a factor of a measured lateral acceleration for determining a rollover index. Bargman, Kimbrough, and Barta fail to teach or suggest a controller for determining a rollover potentiality index in response to weighting the rollover potentiality index by a factor of a measured lateral acceleration for determining a rollover index. Therefore, the rejection of claim 15 should be withdrawn.

Claim 18 recites a control action for changing at least one operating parameter by generating a torque reduction of the engine output for counteracting an actual rollover form occurring. Barta describes a routine for reducing the likelihood of a rollover by applying a corrective brake torque. Barta fails to suggest an engine torque reduction for changing the engine output. Since Barta, Kimbrough, and Barta fail to teach or suggest the features of claim 18 either individually or in combination, the rejection of claim 18 should be withdrawn.

Claim 16,17, and 19-22 depends from claim 15 and are therefore allowable.

Claim 25 has been added which includes the limitations of canceled claim 13 and the preceding claims from which canceled claim 13 depended and is in condition for allowance.

Claim 26 has been added which includes the limitations of canceled claim 23 and the preceding claims from which canceled claim 23 depended and is in condition for allowance.

Claim 24 has been amended to depend from claim 26 and is therefore allowable.

In view of the foregoing amendment and remarks, all pending claims are in condition for allowance. Favorable action is respectfully solicited.

Respectfully submitted,

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